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Mitosis . . .

. . . NABT News

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The American Biology Teacher is a service publication of the National Association of Biology Teachers, teaching the life sciences from elementary grades through college.

The American Biology Teacher is indexed in the Education Index.

COVER PHOTO

One of the first sounds of spring is furnished by the Spring Peeper, here shown on a maple leaf looking for some food. Mr. Charles Walcott, one of our New England members, sends this beautiful photograph with some technical data about it. It was taken with a Graphic View Camera, 135 mm Graflex Optar f4.5 on Arrow Pan 1/5,000 at f32, Electronic flash.

NOTICE

Mr. Paul Klinge, 246 Ohmer Avenue, Indianapolis 19, Indiana, will act as interim Editor-in-Chief for the March, April and May, 1954 issues. This temporary appointment was the unanimous action of the Executive Board at the Boston meeting. The Executive Board is now being polled on the motion to appoint Dr. Richard Armacost, Division of Biological Sciences, Purdue University, West Lafayette, Indiana, and Mr. Klinge as Co-Editors of The American Biology Teacher. All correspondence should be directed to Mr. Klinge until further notice. Dr. Armacost will assume an active role in the near future, at which time his address will be used for correspondence concerning the Journal.

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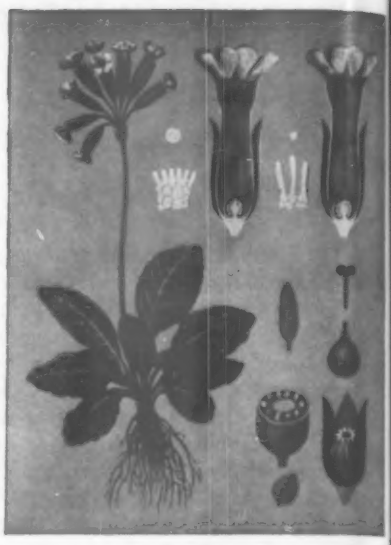

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NUCLEAR DIVISION

GEORGE W. SHAW, West Buckland School, North Devon, England

Assoc. Editor's Note: Bridging the gap between the latest research information on mitosis and what is being taught in the classroom is the attempt here by Mr. Shaw, one of our English members. This material was taken from his thesis for the Master of Science Degree.

The accounts of mitosis found in many high school and college textbooks of botany and zoology are usually considerably out of date. Since new observations are normally published in journals which are inaccessible to many teachers, they find it difficult, if not impossible, to keep abreast of current ideas on this and similar topics.

Vegetative Structure of Nuclei

The nucleus of most plant and animal cells is normally a spherical or elliptical body. In some cases, such as in secretory tissues and human leucocytes, it may be irregularly branched. An irregular nucleus will, of course, have a larger nucleo-cytoplasmic interface. In all cases, the nucleus is considerably denser than the cytoplasm; it can be easily centrifuged out, and dehydration causes less shrinkage of it than of the cytoplasm.

Inside the nucleus we can see a dense and highly refractive body composed of ribose nucleic acid (RNA). This is the nucleolus, the substance of which would seem to be closely bound up with protein synthesis in young cells. Also visible, or stainable at this stage, are the prochromosomes or chromocenters which are the regions of localized heterochromatin. These may be attached to the nucleolus or to the nuclear membrane during the vegetative period.

In addition to these more prominent features, a fine meshwork appears to fill the whole nucleus. This is interpreted as a compactly coiled mass of chromosome threads. The chromosomes are usually invisible in the living nucleus at this stage, since their refractive index in this highly hydrated form is so close to that of the nuclear sap.

Prophase

At the beginning of mitosis the nucleus is seen to be similar to its telophase structure of the previous division. In most cases, the chromosomes appear at prophase in the same positions they occupied at the previous telophase, and prochromosomes can be followed easily from one division to the next with the phase-contrast microscope. These facts support the view that the chromosomes persist from one division to the next in the vegetative nucleus, although not always visible or stainable as such.

At the beginning of prophase, then, coils or contorted threads are seen, each one repelling the others, so that they become evenly spaced in the nucleus. This repulsion is probably due to an electrostatic charge distributed over the surface of the chromosomes. Each thread is double, being made up of two chromatids, but under certain conditions each chromatid seems to be composed of a bundle of fine chromonemata. These basic threads consist of polypeptide fibers, demonstrable by the action of pepsin which dissolves away the fibers. The genes are attached laterally to this basic fiber, normally folded to a great extent, so that the genes are almost in contact with each other. Under certain conditions, such as in salivary glands of certain insects, the basic fiber stretches and the chromomeres, which may be genes or gene groups, can then be seen as separate entities.

Editor's Note: It should be pointed out that the usage of the words "genes" and "chromomeres" as the same entities, while common in England, is not the accepted practice among American cytologists. In the United States there is still some question whether genes are visible by electron microscopy.

The genes or chromomeres, by their staining reactions, are of two kinds. The euchromatic genes produce large proteins. They can be seen to have strong pairing affinities at meiosis and to have highly specific mutations which can be induced artificially by X-rays, nitrogen mustards, etc. The second kind are the polygenes, or heterochromatin, whose nucleic acid cycle differs slightly from that of the euchromatin. When nucleic acid is scarce, the heterochromatin is the first to suffer; then it becomes unstained patches on the chromosomes. Nucleic acid starvation often results

in the failure of a gene to reproduce itself. Thus, when the chromatids part company at anaphase, the unduplicated part causes a breakage or, in some cases, separation is prevented altogether (2). When actively producing proteins, the genes are pushed apart due to the accumulation of the gene product. This is the state of affairs at the beginning of prophase (1).

An increase in the hydrogen ion concentration in the nuclear sap leads to a dehydration of the chromatin material, followed by a spiralization of the threads. This is probably due to the spiralization of the molecules of desoxyribose nucleic acid (DNA), which have the property of indefinite polymerization. This, together with the loss of intergenic protein, results in the contraction of the chromosomes to about one-twentieth of their original length. The spiralization is subject to genetic control and varies with the species, but it is constant within the species. An occasional failure of spiralization leads to abnormally long chromosomes which may fail to part company and stretch across the spindle at anaphase. This has been probably responsible, in the past, for reports of "amitosis." The coiling proceeds independently in each chromatid, so that they are able to separate later without interlocking of the gyres or spirals. The coiling is, however, in the same direction in corresponding sections of the chromatids, but the direction may change at the centromere. This internal spiral of mitosis corresponds, no doubt, to the minor spiral of meiosis; however, no corresponding major spiral is developed in mitosis. During the spiralization, the ends of the chromosomes do not rotate. It is possible that the genes are free to rotate upon one another, thus compensating for any internal torsion which may develop. In the case of the ring chromosomes, rotation of ends would, of course, be a physical impossibility.

The point of the chromosome to which the nucleolus is attached remains uncoiled as a nucleolar constriction. This region contains special genes, the primary products of which are the substances of the nucleolus. While spiralization is proceeding, the relic coils of the previous telophase are unwinding. It is then seen that the rate of uncoiling differs in different parts of the chromosome which is, no doubt, correlated with the spatial distribution within the nuclear membrane.

Another part of the chromosome remaining uncoiled is the centric constriction containing the centromere or kinetochore. At this point, the thread remains single until anaphase. The centromere is found to be the most resistant part of the chromosome and, for its detailed scrutiny, the rest of the chromosome can be dissolved away (7). When this is done, it is seen to be made up of the spindle spherule to which the spindle fibers are attached and the lateral heterochromatic prochromosome-forming segments. The centromere is a compound, mechanical gene which normally splits longitudinally but, abnormally, can split crosswise giving rise to genetically dissimilar daughters.

As spiralization proceeds, a coating of DNA is formed on the chromosome, except at the centromere; this loses all its DNA at metaphase, although a certain amount may have been present at early prophase. The material of the nucleolus—RNA—is converted to DNA, which causes spiralization. If the coating of nucleic acid were to prevent diffusion of gene products, one would expect the centromere to be most active at metaphase, which does, in fact, seem to be the case. Abnormally, some of the nucleolus may persist, undissolved, and still attached to the nucleolar organizer on the equator. In these cases, it is pulled in two at anaphase and carried to the poles.

At the end of prophase the nuclear membrane disappears, except in certain protozoa; there it persists, giving an intranuclear mitosis. In these cases no stage can be picked out as prometaphase, as this is usually meant to cover the time between the dissolution of the nuclear membrane and the end of spindle formation.

Prometaphase

In the cells of lower plants and animals, the centrosomes move apart during prophase to each pole. The centrosome can be regarded as a free centromere, since the two structures are similar in function. In such cells, the centromeres are responsible for the organization of the spindle. Even centrosomes in cells from which the chromosomes have been lost have the power to form spindles. In cells with no centrosomes, the spindles are organized by the centromeres alone. They may arise as complete structures or may be compound structures resulting from the fusion of many small spindles or spindle elements, each of which is organized by a chromosome. When

a centrosome is present at each end, a spindle forms between them—central element—and moves to the middle of the nucleus. The nuclear sap gels to form a compound spindle which increases the total spindle volume. The outer layer of such a spindle is in the form of "spindle elements," each of which is organized by a centromere and corresponds in number with the number of chromosomes. The spindle has two poles, normally, between which the protein chains and water molecules are organized into longitudinal channels. Removal of water causes a contraction in breadth, but not in length, of the spindle. After fixation of cells, striations are often visible in the spindle or spindle fibers. The chromosomes contract fully, and they are now seen as double cylindrical rods of even diameter.

Metaphase

The volume of metaphase chromosomes is constant, but it can be altered by the action of C-mitotic substances such as colchicine (4). Certain chromosomes may, at this stage, show a segment near the end, separated by a constriction and known as a trabant. Even two such trabants per arm (tandem trabants) are not unknown, but such trabants are rare since the constrictions in these cases are vulnerable points where the thread might tend to break. At prometaphase the centromeres appear to be arranged as a flat plate, the equatorial plate, midway between the centrosomes. Large chromosomes on a spindle containing a large element will be arranged around the periphery at equal intervals. The ends of such chromosomes lie free in the cytoplasm and can often be seen to move with the flowing of the cytoplasm. In cases where no central element is present, many of the smaller chromosomes are usually present in the center of the plate. The individual chromatids may now lie parallel or twisted around each other. This constitutes the metaphase plate or full metaphase.

Anaphase

Until recently, it was believed that the poles of the spindle repelled the centromeres until anaphase, when the repulsion waned, and the centromere divided, one-half moving to each pole. This hypothesis, however, assumed that the forces from the poles are at first repulsions and later attractions. Recent papers have advanced more plausible hypotheses which assume no change in the nature of the force on the spindle, and which will explain the prometaphase and anaphase movements (5). Östergren's hypothesis assumes that the forces from the poles are forces of attraction which increase with increasing distance. He compares the force to a piece of elastic stretched from the pole to the centromere. The greater the distance of the centromere from the pole, the greater will be the force of attraction to the pole. The anaphase centromere is attracted to one pole only, i.e., the pole to which it moves. It consists of a "kinetic" or attracted side and an "akinetic" or neutral side. The metaphase centromere consists of the two anaphase centromeres joined by their akinetic sides. This hypothesis would explain the movement of the chromosomes on the spindle at prometaphase, the equilibrium established on the metaphase plate, the orienting movements of the double chromosomes at meiosis, and by separation of akinetic sides, the movement of the chromatids at anaphase. All these conditions can be seen to be due to a single force, unchanging except perhaps in intensity, throughout the process.

At anaphase, then, the single unduplicated part of the chromosome—the centromere—splits longitudinally, one-half moving to each pole, and dragging after it the rest of the chromatid. The centromeres do not reach the poles but stop about halfway. Movement is completed by the expansion of the spindle itself to form the narrow, neck-like stem body. This still shows striations, each of which is, no doubt, a joint between the individual spindle elements. If, for any reason, the chromatids do not part company, perhaps by failure of gene duplication, the spindle becomes tilted, showing that it is, in fact, elongating. At this time, also, any acentric fragments fail to move and are eliminated from the daughter nuclei.

Telophase

The chromosomes are released by the dissolving of the spindle. They at once begin to lose the charge of DNA, the result of which is an uncoiling or despiralization of the gyre. A new nucleolus is formed in each daughter nucleus, and a new nuclear membrane is formed. Uncoiling proceeds inside the nuclear membrane, together with water imbibition, resulting in the loss of fixability. These now constitute the vegetative nuclei.

The process of mitosis can be demonstrated

quite easily in the laboratory, and it requires little apparatus. Methods may be found in the material numbered 3 and 6 in the bibliography.

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Science Teaching for Better Living

THOMAS P. FRASER, Morgan State College, Baltimore, Maryland

Can science classes improve community social problems? The author, in charge of science education at Morgan State College, believes that they can. He received his Ph.D. from Columbia University and is currently interested in research in college general education and science teacher education. In the National Association for Research in Science Education he is Vice-Chairman of the College Level Committee.

There is a constantly increasing mass of research evidence indicating that schools may assist in the improvement of the standards of living of people in a community. The Project in Applied Economics, sponsored by the American Association of Colleges for Teacher Education, conducted an experiment in better living through the schools.[1] This project proved conclusively that community data and facilities connected with food, clothing, shelter, and health could be used to adapt teaching to a variety of community needs. Moreover, the Project showed how schools could be used to improve the civic, social, cultural, and economic levels of living of people in communities.

This is not the traditional conception of science teaching. It is, however, a functional as well as an expanding conception of what science instruction can do to meet personal and community problems.

THE SKILLS NEEDED

A study conducted along this line identified the need for developing certain competencies which are associated with this new and expanding conception of science teaching.[2] These skills are:

1. Teaching competence in functional areas of science.
2. Teaching competence in non-science areas.
3. Teaching competence in the scientific method of problem solving.
4. Functional understandings of the purposes of the evolving high school, its program of general education, and the place of science in the total school.
5. Competence in the use of teaching materials.
6. Skill and desirable attitudes toward using community resources and data in achieving purposes.
7. Competence in planning, organizing, and administering extra-class activities.
8. Teaching and counseling competence in the area of intercultural relationships.
9. Understanding of human growth and development.

Any close examination of these nine competencies will serve to indicate the need for developing science teachers who feel confident in dealing with a variety of teaching materials, and community resources and data. Indeed, it reflects the need for teachers who envision the social ramifications of science.

IDENTIFYING THE COMMUNITY PROBLEMS

In the study previously mentioned, a section was devoted to the "Availability, Use, and Value of Community Resources and Data." Science teachers in Maryland were asked to indicate whether or not the kinds of community resources listed were available and used in their teaching.[3] They were also asked

[1] Young, G. Marian, and Moore, Hilda. *A Community School of Action*. University of Florida, Gainesville, Florida. 1944.

[2] Fraser, Thomas P. Science Teachers' Objectives and Attitudes Toward Using Community Resources. *Science Education*, December, 1949, Vol. 33, pp. 352–361.

[3] Resources and data were itemized under the following headings: I. Human Resources; II. Food, Clothing and Housing Conditions; III. Natural Setting; IV. Industrial Resources; V. Transportation and Communication Facilities; VI. Local History; Government and Religious Preferences; VII. The Activities of Teachers.

to indicate what value was attached to each kind of resources or data regardless of whether or not it was employed in their teaching.

Teachers who participated in the study were conducting projects designed to improve personal and community living. The results of the study were:

Housing. The highest percentages of these teachers were using data and/or facilities on housing as follows: fire and safety hazards; provisions for comfort and health; sanitary conditions; need for beautification; need for control of termites, other insects, and rats; and, heating and insulation. The highest percentages of teachers included in the study considered the same items valuable. They added: number who rent homes and conditions of the home to the list concerned with importance and value.

Food. The concern of the people of the community for conservation was regarded as the highest ranking item in usefulness and value in connection with food. Additional items of high rank in usefulness and value included: number of farms, gardens; concern for inspection and examination of food handlers; family budgets; food processing plants; and the concern of the community for adequate diets for all people.

Clothing. The highest ranking item on clothing was stores. Slightly more than half of the teachers studied regarded natural and synthetic fibers valuable in science teaching.

Health. The health objective loomed large as a functional area of science instruction. The highest percentages of science teachers studied used the following facilities and data in connection with area of health: garbage disposal, causes of illness, causes of death, water supply services, communicable disease services, school medical services, food and milk control, sanitary inspection, dental services, vital statistics, hospitalization services, local health officers, general medical services, and finance of the health department.

IMPROVING COMMUNITY LIFE

The schedule used in the study also asked for responses in the form of written paragraphs on the manner in which science teaching had been used to improve the level of living in the various communities of Maryland. The responses showed specific instances in which projects were designed to achieve this result. The following excerpts and quotations reflected this challenge:

Food. An agriculture and science teacher listed visits to pupils' garden projects as a functional teaching device. He asserted that "in our visits to dairy farms we analyzed the feed content to be fed to cows, and conducted a milk test to determine the butter fat content." Obviously, he was teaching some functional aspects of milk and of a balanced diet. Moreover, the encouragement of growing good food at home is certainly of considerable economic benefit.

A Baltimore science teacher had this to say about foods:

> "We conducted tests to determine the foods that contain one or more of the nutrients. We surveyed the food stores in the community to determine those retailers who observed pure food regulations and those who did not."

The pupils combined this information with resources they had collected in connection with housing and clothing, and presented a play to the school and in a church.

A third teacher attacked the problem by showings of films, talks by the state nutritionist, and planning of diets. On the last point he said, "We have had the children plan the diet at home and asked the parents to let them carry them out; about 25% cooperated."

Housing. The chairman of a science department had his class prepare a check list of specifications for standard housing. This list was checked against the houses in which the pupils lived. Emphasis was placed upon sanitary living in the home. Skits and plays were used by another teacher to show how good housekeeping and cleanliness helped to destroy rodents and insects. Movies, talks by officials from the housing authority, and trips were used by a third teacher.

In commenting on fire and safety hazards, a junior high school teacher wrote:

> "We cooperatively planned a trip to the fire house; learned how alarms are sounded and answered according to zones; discussed the causes of fires, stressing oil stoves, electrical connections, and gas. We showed by demonstration the effects of poor electrical connections, and the results of collected gas in poorly used gas stoves."

A senior high school teacher wrote:

> "In the study of lighting conditions in physics, I demonstrate the best methods of indoor illumination and endeavour to show pupils the best type of lighting to use in doing their homework."

Clothing. The head of a science depart-

ment stated that tests had been conducted to determine one kind of textile fiber from another. This information was used to establish a set of principles governing the hygiene and proper care of clothing. Another teacher asserted that cleanliness in connection with clothing was emphasized, and that projects designed to encourage the proper kind of clothing for the climate had been developed.

Health. Some teachers commented on health as follows:

> "We have cooperated with the county nurse in stressing causes of ill health and in developing techniques of keeping well."
>
> "We have cooperated with the health department in stressing in our classes the services provided by this agency."
>
> "We have worked with the PTA in encouraging parents to have X-rays when mobile units visited our town. We have also encouraged parents to visit the health department."
>
> "We have assisted the health department in keeping the rural water supply safe."
>
> "The health department furnished us with various kinds of data on types, causes, and symptoms of diseases. These data were used in classroom discussions."
>
> "Health officers have served as resource persons in developing the school's health program."
>
> "The lack of adequate sanitary facilities provided excellent material for problems in sanitation."
>
> "Data on the causes of death in a community were used to assist in preventing some diseases and reducing the death rate."
>
> "We studied the causes of illness in our community and encouraged the proper care of the body. The unit resulted in improved health habits."

The teachers studied worked with agencies and organizations of the communities; they rendered a variety of services to school communities.

These are specific instances in which a philosophy of science teaching has been translated into a series of vital practices. There are implications for both the pre-service and in-service education of teachers in science.

TRAINING THE SCIENCE TEACHER

The recommendation of the study initiated the Science Workshop for Teachers at Morgan State College during the summer session of 1949. The Workshop has now been in operation for four consecutive summers. A number of nationally prominent consultants, as well as the resident members of our science and education staffs, have contributed to the development of the course.

The morning sessions have been devoted to the presentation of problems of science teaching and individual and group conferences with the participants in the Workshop. These sessions also involved discussions, showings of films and kodachromes, and demonstrations.

The afternoon sessions have been devoted to group and individual work on projects and on a continuation of individual or group conferences with the consultants.

A number of interesting exhibits have been assembled. Among them were: exhibits on the resources of Chesapeake Bay and their conservation; the inland resources of Maryland; soil conservation; conservation of forests and wild flowers; nutrition; fisheries; audio-visual aids; and science for better living.

The economic importance of the blue crab and of the oyster industry have constituted centers of real interests to the participants. A field trip on the Chesapeake Bay where the group studied oyster farming and commercial fishing provided an opportunity for work and recreation.

Out of this background of experience, participants have worked on a number of projects and source units. These units have included organized attempts to solve problems centered in: science for general education, using community resources in teaching, audio-visual materials and methods, the earth and the universe, the life of the earth, the energy of the universe, and using science to make a better world.

An elementary school teacher worked on a unit entitled, "Improving Our School Grounds Through a Study of Plant Life." Her class worked on a sub-problem captioned, "How Can We Beautify the School Grounds?" The activities engaged in were concerned with a flower garden in the spring. The class learned about plants and how to care for them through a need for beautifying the school surroundings. Moreover, they learned about the interrelationship of plants and animals, and the importance of soil. They secured help from the agricultural extension agent and from successful farmers, some of whom were parents.

A high school teacher worked on a teaching unit involving persistent problems of his county. These problems were centered in erosion, the "vanishing oyster," and the "vanishing shad." His unit was also concerned with superstitions. In the foreword to his unit he

wrote, 'My aim is to assist the children and parents of the community in solving these problems, which are mine, as well as theirs." A sub-problem of his unit was entitled, "What Is Your Responsibility in the Question of Erosion?" Some of the activities suggested in this area were: field trips to the Department of Research and Education and to examples of land starting to erode, a father-son banquet for the purpose of discussing the seriousness of wasting the soil, and a church program. The last program would be centered in a discussion of erosion and would be augmented by a showing of appropriate films.

The following unit titles may well serve to show the concern exhibited by the participants in the workshop for planning science experiences that are real to pupils:

How can we increase our life span by using good health habits?
What is the importance of water to life?
What is the importance of milk to life?
How can the school improve the living conditions of people in the community?
How can we develop good habits of safety through science?
How can conservation of resources enrich our ways of living?
How does the Lafayette Food Market serve as a helpful community resource?
How is calcium a builder of strong bones and teeth?
Foods: The basic seven.

This listing of units is by no means complete, but it serves to illustrate how participants in the Workshop have focused their work on school and community problems.

CONCLUSIONS

1. The research evidence collected by the Project on Applied Economics showed that community resources and data connected with food, clothing, housing, and health have been used in experimental schools to assist the raising of standards of living in the communities in which the schools are located.

2. The author's study of science teaching practices in Maryland identified the need for developing certain competencies associated with new directions in science education.

3. The Workshop has focused attention on the development of these competencies as they relate to the study of personal and community problems. The participants in the Workshop have developed source units and have planned learning experiences that are designed to improve the civic, social, cultural, and economic levels of living of people in the communities in which they teach.

Microscopic Study of Living Leaves

RICHARD R. ARMACOST, School of Science, Education and Humanities, Purdue University

Detailed internal structure of living leaves can be studied microscopically by means of free-hand sections as well as the more conventional prepared slide method. The free-hand section technique is neither complex nor expensive. Materials needed are: fresh leaves, elder pith or some other type of soft pith (which can be purchased or collected), and a *sharp* single-edged razor blade. It has been found that student interest is greater when common leaves are used. Fairly-thick, firm, unwilted leaves such as those from many of the ivy plants are easily cut. *Ficus* (rubber plant) and other somewhat fleshy leaf types can be used, but may have peculiar internal leaf structure. However, almost any leaf can be successfully sectioned by this method after a moderate amount of practice.

Figure 1

A small rectangle of leaf is cut from a selected area between major veins (Figure 1). This is then placed between the halves of a vertically split piece of pith (Figure 2). The two pieces of pith are put together and the leaf section is held firmly, but not squeezed, between them. The pith aids in guiding the blade across the rectangle of leaf. The thumb should be slightly below the top of the pith (Figure 3). Then, by using a drawing—not chopping—motion, a sharp razor blade is drawn across the material, cutting the first

Figure 2

half of the split pith, the leaf section, and the second half of the split pith. A thin slice of pith, leaf, and more pith results, and is placed immediately in water to avoid desiccation and subsequent collapse of leaf cells. Periodically a check is made to see if the leaf sections are thin enough for study. If the top surface of the pith becomes uneven, it is evened up before additional sections are attempted. This permits the production of truer cross sections. The great advantage of studying leaves in this way is that students or teachers can quickly prepare temporary, water-mount slides from the sections cut. These slides are

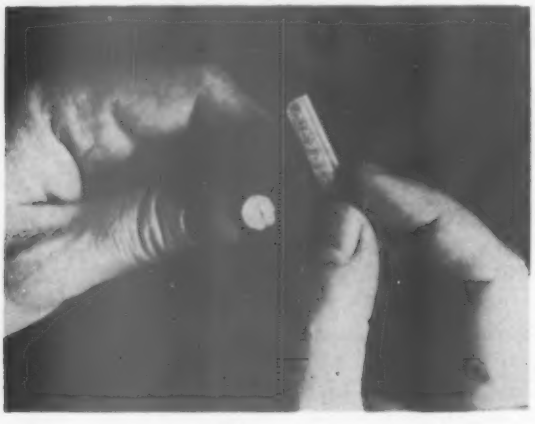


Figure 3

not only economical, but also have the advantage of permitting a study of the green chloroplasts, veins and other leaf structures as they occur in the living leaf. At first, sections may be too thick for detailed study, but with a little practice reasonably thin sections can be produced. Sometimes a section is feather-edged or thinner at one end than the other. The thin end can then be studied. By using glycerin in a mount instead of water, sections can be preserved for several hours.

In addition to free-hand sections of leaves, water mounts of whole leaves from water plants such as *Elodea* and *Vallisneria*, two common aquarium plants, can be used to show chloroplasts *in vivo* and general cell structure. Usually if these plants are placed in the sun or gently warmed a short time before the class period, streaming protoplasm can also be observed.

Many common, broad, angiosperm leaves such as elm, tulip poplar, maple, grape and others when placed under the low power of a microscope will show venation pattern to good advantage as light shines through the semi-transparent veins. This can also be seen macroscopically by holding a whole leaf in front of a bright light. Trichomes or plant hairs, and epidermal cells including location of stomates can be observed best by using low power and top light only. General structure of this nature can even be seen with a hand lens and top light.

Associate Editor's Note: This is the result of a "mental explosion" which Professor Armacost had when he saw a biology teacher wave a leaf in front of the class and simply talk about leaf structure. Dr. Armacost is Associate Professor of Biological Education at Purdue.

Tearing a leaf and studying the torn edge affords a view of some of the mesophyll cells containing the chloroplasts as well as the stomates. *Tradescantia* or Wandering Jew and *Sedum* are useful for stomate study when the epidermis is stripped off and mounted.

The use of living material in leaf study need not entirely replace the use of prepared slides. Instead, it is a way of supplementing prepared slides and textbook or other illustrations. One of the most interesting, basic lessons in plant biology can be concerned with the internal study of common, angiosperm leaves. Strangely enough, very few teachers take advantage of the simple ways, previously described, which can make structural leaf study interesting and effective in understanding the major site of the greatest energy conversion known to man.

Dr. Clarence H. Faust, Pres. of **The Fund for the Advancement of Education of The Ford Foundation,** recently announced Grants to 16 colleges and universities totalling approximately $280,000 for institutional self-surveys of some aspect of their liberal education programs. Last year, in the first series of such Grants from The Fund, awards aggregating $428,708 were made to 21 institutions. As a publication vitally interested in liberal education in the life sciences, ABT extends to Dr. Faust and The Fund our sincere gratitude for this very substantial help in this area. The Ford Foundation also announced a Program of Scholarships and Fellowships for young men and women who wish to begin or continue studies of The Soviet Union or peripheral Slavic and East European areas. These Study Programs include the natural sciences. Information may be secured from **Dr. Gordon Wray,** Chairman, Board of Overseas Training and Research, 575 Madison Ave., New York 22, N. Y.

At the speaker's table: (left to right), Bernarr Vance, Mabel Potter, Brother Charles, President-elect Arthur Baker, Russell Mason, Retiring President Leo Hadsall, Prof. John Bonner, E. Laurence Palmer, Muriel Beuschlein, and Irving Keene. The picture was taken by the genial Dr. Harvey Stork at the luncheon meeting of the NABT at the annual meeting held in Boston, December, 1953.

GREETINGS FROM THE PRESIDENT

Boston was a thrilling experience in many ways, but the most thrilling of all was to get to know so many of you personally. So often our associations are based on ideas on paper, with a name at the bottom, but now these names have become meaningful. They represent persons I can visualize.

And through knowing each other, we have strength. For we are no longer subscribers to a journal, good as that might be, but we are active participants in a service organization; we feel a oneness with it and its problems.

My goal this year is to have all of you feel that way. I want to know you, and want you to feel that you know me. Our association wants to serve you, and it can only accomplish that if you serve us.

Write to me. Offer your services. Send me your "Gripes of Wrath." In that way we can get to know each other, and we can be of mutual service.

Many of our committees need expanding. Our committee chairmen have grand dreams that can only become a reality if we pitch in and help. Are you with me in '54?

ARTHUR BAKER,
Community High School,
Crystal Lake, Illinois

NABT MOVES AHEAD

The National Association of Biology Teachers has been invited to membership in the American Institute of Biological Sciences and, through the action of its Board of Directors at the annual convention, has accepted. The Institute, commonly known as AIBS, is an overall service organization that is prepared to serve member societies in the various fields of biology. Among these are the American Society of Zoologists, Botanical Society of America, Ecological Society of America, and the Genetics Society of America. The total membership is eighteen societies. Eleven others are affiliated but not members. There are eighteen associates, a name applied to scientific commercial companies.

The official journal, The AIBS Bulletin, is published five times a year in January, April, July, August, and October. The August number is the program number for the annual AIBS convention meeting. The subscription price is $2.00 per year, but it is sent to all biologists as a part of their membership fee in one of the member societies. Thus, NABT members will receive a second journal that carries news of biological teaching and research, papers of general interest to biologists, but no conventional reports of biological research. Its columns will be open to NABT for disseminating information about its work, programs of regional meetings, and other mat-

ters that pertain to the teaching of biology. Most of the members of the other participating societies are also teachers of biology who are naturally interested in the field that NABT represents.

The annual assessment for membership in AIBS is $1000. It is hoped that this can be met by our treasurer by increased memberships resulting from the greater appeal to biology teachers because of the services AIBS renders its members. Through the Bulletin member societies are served in building better public relations for biologists by its circulation among all member societies. Its placement service, costing $10.00 for non-members, is open to individual members without added cost. AIBS arranges the annual meetings for member societies and others, usually in the first week in September. In the past two years, NABT has taken advantage of this service by holding regional meetings in conjunction with AIBS on the campuses of Cornell University and The University of Wisconsin. AIBS can add its strong influence in the promotion of our national projects and in securing grants toward carrying out such projects for the study and improvement of biology teaching.

While AIBS can contribute much to our society, it is also true that we can contribute to AIBS in helping them bring together in a united front all the forces that contribute to better biological teaching and research.

Dr. Harvey Stork,
Carleton College

REPORT ON CONSERVATION WORKSHOPS

The need for a condensed report on Conservation Worksheps held throughout the country during 1952 and 1953 and those to be held in 1954, was expressed at the annual meeting of the National Association of Biology Teachers in Boston during the last week of December. A working committee of nineteen biologists, other scientists, and education consultants volunteered to gather information for such a report from all state and parochial institutions of higher learning by the middle of February, 1954.

Bert Robinson of the U. S. Soil Conservation Service was named chairman of the Workshop Committee. A two-page questionnaire entitled "Report on Conservation Workshops," was prepared at the Boston meeting. Several copies of the questionnaire, along with copies of a suggested form letter to be used in soliciting institutions, have been sent to all Regional and State Chairmen of the Conservation Project of NABT, as well as members of the Workshop Committee. The questionnaire is prepared in such a manner that up to three workshops may be reported on the same form.

As soon as the information is obtained on workshops it will be compiled and approved by the Workshop Committee. The report will be reproduced in sufficient quantity for adequate distribution by the U. S. Soil Conservation Service, in cooperation with the Conservation Project of NABT.

This report should be very helpful to faculty advisors in science teaching, and teachers, in selecting workshops for the summer of 1954. It is hoped that this publication will be available late in March of this year.

Bert Robinson,
U. S. Soil Conservation Service

Conservation Project News

Seventy-two members of the National Conservation Committee of the National Association of Biology Teachers, representing 34 states, participated in a three-day work conference as a part of the annual meetings of the American Association for the Advancement of Science.

The State and Regional Chairmen for the Project assisted by ten members of an Advisory Committee and the Executive Committee edited a 360-page manuscript which will be printed in 1954 as a Handbook on Teaching Conservation and Resource-use Education. The Handbook will contain over 150 descriptions of conservation projects or programs from 30 states, submitted by teachers through the members of the National Conservation Committee. The Handbook will be published by the Interstate Press of Danville, Illinois.

The Conservation Project has been underwritten for the first three years by a $10,000 grant-in-aid from the American Nature Association.

The National Committee decided at its annual meeting to continue as a permanent

Project and Committee of the National Association of Biology Teachers, so as to implement many of the projects currently sponsored and to expand the program in the areas of teacher training and state cooperation. Additional descriptions of outstanding school programs will be solicited and published in the journals sponsored by many national organizations with representatives on the Advisory Committee.

Additional information on the Conservation Project and about the other publications currently available should be addressed to Dr. Richard L. Weaver, P.O. Box 2073, Ann Arbor, Michigan.

ASSOCIATE MANAGING EDITOR

Robert L. Gering, Associate Managing Editor of the ABT, is Research Ecologist of Arachnids for the University of Utah's Ecological Research Project. He attended Freeman Junior College, Yankton College, and the University of South Dakota in his home state, and Bethel College in Kansas. Gering's six years of active military duty were in enlisted service in the Army's Medical Department and commissioned service as an Infantry officer in the South Pacific, and in the U. S. Military Government in South Korea.

Resuming his education upon his return to the United States he completed his A.B., M.A., and Ph.D. degrees at the University of Utah, majoring in invertebrate zoology with special concentration on arachnology. He served as chairman of the Biology Department and of the Natural Science Division at Bethel College [1948–1953] before joining the University of Utah staff.

A member of many professional and technical organizations, Gering is devoting most of his "leisure" time to NABT activities and to committee work [including that of membership chairman for the Society of Systematic Zoology]. Although he considers the spiders and pseudoscorpions to be his primary interest, he remains active in audio-visual work, especially in exploration of new techniques and the development of new equipment. Mrs. Gering, a graduate biologist with several years of elementary teaching and of professional chemistry [U. S. Bureau of Mines] experience is "my constant companion and right hand." She has collaborated with Dr. Gering on several studies in human genetics and is currently collaborating with him on several papers in arachnology.

NSTA NATIONAL CONVENTION

The second national convention of the National Science Teachers Association is scheduled for April 1–3, Morrison Hotel, Chicago. Robert Carleton, NSTA Executive Secretary, says that, "This will be the largest gathering of science teachers ever held in this country." Convention chairman is Prof. Ralph W. Lefler, Purdue University, and Dr. Charlotte Grant, Oak Park, Illinois, and president of the NSTA, will preside. Beside prominent research scientists reporting on their fields, speakers will include Harlan Hatcher, president of the University of Michigan, Mrs. Agnes Meyer, Washington, D. C., Paul B. Sears, Yale University, and Detlev Bronk, president of the National Academy of Sciences. There will be twenty-two discussion groups taking up some phases of science education. "Here's How I Do It" sessions will emphasize practical methods and laboratory procedures for science teaching. Business-industry cooperation will be shown in many ways during the convention from the many exhibits to the "Chicago Hospitality Night." A major session will be devoted to the Future Scientists of America Foundation. Indeed, this is a convention members of the NABT will find productive and stimulating. Information about the convention may be obtained from Robert H. Carleton, Executive Secretary of the NSTA, 1201 Sixteenth Street, Washington 6, D. C.

A new scientific journal on vegetable medicine, "Acta Phytotherapeutica," in English, French, and German, appeared in January; also "Vocabularium Botanicum," a book on plant terminology in six languages. "Materia Medica Vegetabilis," a book on botanical drugs in four languages, will be published in 1954. If interested in these, write to: E. F. Steinmetz, Keizersgracht 714, Amsterdam-C., The Netherlands.

Prof. Donald J. Cram, Univ. of California, states: "Investigations of the chemical structure of the antibiotics indicate that each of these drugs has some peculiar arrangement of atoms which has not previously appeared in natural compounds. Organic chemists formerly believed that such chemical arrangements simply could not be produced by nature. Once it was established that the molds from which antibiotics come were capable of producing unique types of molecules, however, organic chemists once more plunged into work on the drugs' chemistry with a far more open mind." The result, new synthetic drugs.

Two free full-color filmstrips, "Food from the Sun" and "Sugar Through the Ages," are available for your permanent film library from Audio Visual Associates, Box 243, Bronxville, N. Y. The first one named is especially suitable for life science instruction at the junior high school level.

OPEN HOUSE IN THE BIOLOGY DEPARTMENT

By "The Old Fossil," at Wells High School, Chicago

An excerpt from a letter received in mid-October: "I was greatly interested in your notation, 'Science Open House Held Last May' (*The American Biology Teacher*, Oct. 1953). As we plan to have one next May, have you any suggestions that would help me?" It was signed by Sister Celestine, Alleman High School, Rock Island, Illinois. TOF believes that his reply will interest others.

"Open House," in this article, is limited to occasions when the school is visited by parents, inspectors, or select visitors. The date is set well in advance. The purpose is to permit visitors to view the physical plant and personnel as a functioning unit. No two "Open Houses" TOF has visited have been alike. This is as it should be; it represents the school in action.

Open House means clean house. The room, adjacent area, and desk should be in proper order and dusted, the wastebasket empty, and blackboards clean. Bulletin boards should display attractive current materials. Students may cover the bases of potted plants with colored paper or aluminum foil, clean and arrange lockers, cabinets, and shelves, polish glassware, retouch and repaint models and apparatus, and refresh aquaria. Art students may prepare signs needed to label displays. Signs will also be needed for instructions, identifications, and descriptions. Painted wood blocks, $1'' \times 2'' \times 6''$, with $\frac{1}{2}''$ saw kerfs, can be used to support the signs.

A simple form of Open House could be for an inspection, as after the dedication of a new building. Or it could be for a periodic check, by the public, to determine the adequacy of facilities.

More often Open House is held to permit parents and others to observe school activities. Visitors may evaluate students' records, observe accomplishments and see the students at work. Open House held for any of these reasons, is an excellent opportunity to sell the school to the public.

Some schools hold an Evaluation Evening. The parents visit each of their children's teachers. Pupils are not present; it is a teacher-parent conference. Frequently the discussion is about the character and personality of the child, and may lead to better understandings.

Another Open House theme may be Student Accomplishments. This may be an elaborate display of notebooks, projects, collections, charts, graphs, and essays. Sections of the blackboard may be assigned to pupils for biological drawings in colored chalk. Seasonal materials may be displayed on the walls.

The biology department can help other departments on Open House night. Potted plants, raised in the growing room, can be placed in classrooms, and seasonal flowers in the office. Outstanding biology projects may be displayed at a prominent place in the school. The illustrations with this article show such projects, and are part of a unit of 12 similar table displays made during our Open House last May. Advance planning usually brings out much creative ability in the students, and teaches team work.

Another type of Open House is active participation by the students. The regular school day may be shortened by two periods in the afternoon. In the evening students return for these two periods. Parents and others visit classrooms and laboratories. Laboratory work, in the Biology Department, is excellent for this type of Open House. Students may dissect, work with the microscopes, or engage in

Here is a "Cactus Garden" prepared for Open House. Potted plants, from the school greenhouse, were set in sand to create the landscape effect. Labels were student-made. The Mexican cart was student-inspired to lend "atmosphere" to the scene.

other activities. Students may make projection slides prior to Open House. These slides are projected on a screen, and the pupil responsible for making a particular slide gives a thumbnail sketch describing it. This type of Open House has many good features. It is intensive and full of action. However, the visitor sees but one teacher and his pupils in action.

On Open House night, teachers need assistance. Mature students may be selected from each class to run errands, serve as messengers in coordinating all departments. Monitor students may be used to direct traffic, and to escort groups or special guests. Teacher Aides may be used to guard displays, and to protect fire alarms and telephones. A group of the "extra specials" may serve as junior teachers, answering questions, describing displays, and giving information.

"Bottle Gardens" (background) were individual pupil projects, each pupil furnishing his own container. "Gardens" were first planned on paper; plants were then measured, and set up. "Seed Germination" (foreground) showed soil preparation, methods of seeding, and seedlings in developmental stages.

TOF suggests that the Biology Department print its own program. However, if the Open House Committee prepares the general program, it should be a printed directory-program. In this case, the biology instructors prepare their comprehensive section for the master program. This should include room numbers, room locations, and names of instructors, and the activity planned for the room.

Observe all rules for safety from accident and fire. Panic can easily be created within a group of visitors. Recently a Chicago teacher made the newspaper headlines; a minor accident at Open House was compounded into a second accident, which in turn created so much confusion that panic was the result. Fortunately, the two or three taken to the hospital had but minor injuries. The incident did leave a bad taste for Open House. Keep house phones and fire alarms open for service.

This year's officers of long-time active New York Association of Teachers of Biological Sciences are: Herbert Nestler, Pres.; David Sygoda, Vice-Pres., Acad. H.S.; Ruben Fuchs, Vice-Pres., Voc. H.S.; Ira Shein, Vice-Pres., Jr. H.S.; Marion Richter, Rec. Sec'y; Samuel Brownstein, Corr. Sec'y; Henry Pollet, Treas.; Milton Lesser, Rep. to Sc. Council.

PREPARATION OF INSECT MOUNTS

The general biology student who observes and handles an insect individually is more likely to remember key characteristics and to become interested in entomology than the one who merely looks at a specimen or group of specimens in a box or mount.

We have solved the problem of neat storage combined with the possibility of individual handling by mounting insects on pieces of cork one and one-half inches square. Sheets of cork one-fourth inch thick can be purchased inexpensively and cut into squares with a sharp scalpel or razor blade. After the insects are mounted by means of insect pins on the cork squares, each one is sprayed with an acrylic plastic spray as outlined by Pond.[1] Various plastic sprays are acceptable for use. The cork mounts fit easily into boxes for storage.

Specimens prepared thus have been handled in our laboratories by more than 100 students without the usual loss of delicate parts of fragile insects.

Sister Mary Benita Pieper,
Chairman, Department of Biology,
Marycrest College.
Davenport, Iowa

Across The Editor's Desk

Paul A. McGhee, New York University, lodges a "true bill" for adult education against our colleges, stating: (1) "Adult education takes place in community action groups, but our colleges essentially stand apart from our thousands of communities; (2) the colleges' basic commitment is to subject matter scholarship, but the need of adult education is not for information but for experience in group work; (3) the colleges have only teachers, whereas the adult education movement needs leaders."

[1] Pond, Gordon G., Preservation of Insect Specimens, *Turtox News*, Vol. 31, No. 4, p. 69. April, 1953.

The script for a **fine dramatic play,** "To Live in Faith," is available free by writing to: UNESCO, U. N. Headquarters, Room 2201, United Nations, New York.

An all-time record of over 3,800,000 pupils in Catholic schools of the U.S. has been set this year, an increase of about 500,000 pupils in two years.

Improving Transition from School to College, **a new book** edited by Agatha Townshend and Arthur Traxler (Harper and Bros.), observes: "One who reads slowly, and with poor comprehension, is not fitted for advanced study. Colleges could make noteworthy improvement in their admission procedures by giving greater attention and weight to reading achievement, knowledge of use of the library, oral and written expression, and skill in taking notes." It urges also that high schools place added emphasis on reading.

More than 1500 delegates came to Washington Dec. 2 to talk about land, food, waterpower, minerals, fuel, and people. They tried to find out whether or not our natural resources will continue to support us in the manner to which we have become accustomed. Our national income of over 300 billion dollars last year was made possible through ready use of our ores, petroleum, farmland, forests, and grasslands. Some argued that, with the development of science and technology, we can earn over 600 billions annually by 1975. Less optimistic delegates warned us not to count our billions before they are produced, that many resources are not renewable, and that our population is growing rapidly. Many seemed more interested in the present than in the future. They want public lands placed under private "cultivation," atomic energy plants under private control, and resources in general freely exploited. They are restive under 20 years of conservation "controls," and reason that, if we continue to raise our standard of living and devote more of our wealth to science and research, we shall develop fully that most precious natural resource of all—an able, talented, and resourceful people. **Life science teachers** will be interested in some of their observations in the latter area: (1) if we double our national income, we can spend 15 billions annually on education; (2) schools and colleges should intensify their search for gifted pupils and guide them into careers in science, so that the potential of science can be reached; (3) for some time yet we shall have to export vital resources to and import others from Asiatic countries, but we know comparatively little about these fast-awakening peoples; (4) conservation will have to take on a deeper and broader meaning, and schools must teach conservation as an intricate interplay of many forces involving population growth and trends, known resources, resources yet to be exploited, and the potential of science for the future.

Hydrogen-3, or tritium, main constituent of hydrogen bombs, may soon prove of great benefit against cancer because of its extremely short-range radiation properties. Certain chemical compounds are absorbed by cancerous cells more readily than by healthy cells. If these compounds are "tagged" with tritium, the short-range rays may reach only the cells which absorb the compounds, leaving neighboring cells undamaged.

Books For Busy Biologists

BRULLER, JEAN (Vercors). *You Shall Know Them.* Little, Brown & Company, Boston. 249 pp. 1953.

In this brilliant French novel the scientist may look upon his problems as an outsider. He may view a satire around the hoary and puzzling question, "What is man?" The anthropologist isn't at all certain what man is. Newspapers report strange creatures having been spotted in the jungle which seem to be borderline human types. The sociologist contributes to the uncertainty, and the psychologist cannot circumscribe *Homo sapiens* with definite demarcation. Therefore, if Paranthropus should come into reality as an intergeneric cross, a new set of codes and moral precepts might also have to be devised to fit the circumstances. You will be absorbed, if not stabbed a bit intellectually, by pondering over the legal and scientific predicaments presented by Jean Bruller.

CHARLES E. PACKARD
Randolph-Macon College

ANON. *Biology As a Career,* Research Bull. No. 3. Institute for Research, Chicago, Ill. 24 pp. 4 illus. 1951. $1.00.

This bulletin should be very useful to biology teachers in advising pupils about biological vocations. Even just placed in the hands of a student, it would answer many of his questions. The scope of biology is briefly outlined and then subdivided into special fields, especially those which have practical applications and point toward the professions. The importance of biology to agriculture, conservation, fisheries, industry, health, and education is pointed out. A synopsis of federal, state, city, industrial, and educational positions held by biologists is given. Qualifications, training, and salaries for various biological professions are discussed. The discussion is non-technical and brief, but some definitions are vague. While the coverage is neither complete nor detailed in such limited space, it serves as a satisfactory introduction to stimulate thinking about careers in biology.

RALPH W. DEXTER,
Kent State University, Kent, Ohio

STERN, CURT. *Principles of Human Genetics.* W. H. Freeman and Co., San Francisco, Calif. xi + 617 pp. illus. 1949. $5.50.

"Nothing interests humans so much as themselves." This excellent textbook discusses the fundamental principles and applications of genetics from the viewpoint of human heredity. It has won wide acclaim among college instructors, and is also used by physicians, social workers, and general readers as a source of informational materials. The book is well-illustrated, and written in an attractive and readable style. The author's answers for the stimulating problems at the clase of chapters can be obtained separately from the publisher. The index is comprehensive and complete. Quite evidently the book contains more material than can be covered in a single term, but this broad coverage will be found useful for reference work and in tailoring courses to suit the needs of varying groups of students.

B. BERNARR VANCE,
The University of Dayton

MOLDENKE, H. N., AND MOLDENKE, A. L. *Plants of the Bible.* Chronica Botanica Co., Waltham, Mass. xx + 364 pp. 95 illus. 1952. $7.50.

The only modern, comprehensible survey of plants and plant products mentioned in the Bible, published as Vol. 28 of "New Series of Plant Science Books," and edited by Frans Verdoorn. The contents give much data, and the bibliography lists a small library in itself. The "Index to Bible Verses," and "Index of Plants, Authors, and Subjects" are well-prepared. Parts of the book serve as a Concordance with the Bible; the main portion is of interest to botanists. Each of 242 species receives some attention, but more for those important in Bible times. This book is timely and useful, especially with late editions of the Bible.

F. U. G. AGRELIUS,
State Teachers College,
Emporia, Kansas

RIESE, WALTHER. *The Conception of Disease.* The Philosophical Library, New York. 120 pp. not illus. 1953. $3.75.

Medical Doctor Riese traces various concepts of disease from their historical beginnings in primitive magic to the present day, analyzes them in an authoritative and interesting manner, and makes discerning comments about their impact on history and culture. His analysis of the relationships between art and the anatomical concept is especially good. The attractively-bound book is indexed, and has numerous illuminating footnotes. Although rather heavy reading, it can be recommended for background understandings.

B. BERNARR VANCE,
The University of Dayton

OPARIN, A. I. *The Origin of Life,* 2nd Ed. Dover Publications, Inc., New York. xxv + 270 pp. illus. 1953. Cloth $3.00; paper $1.70.

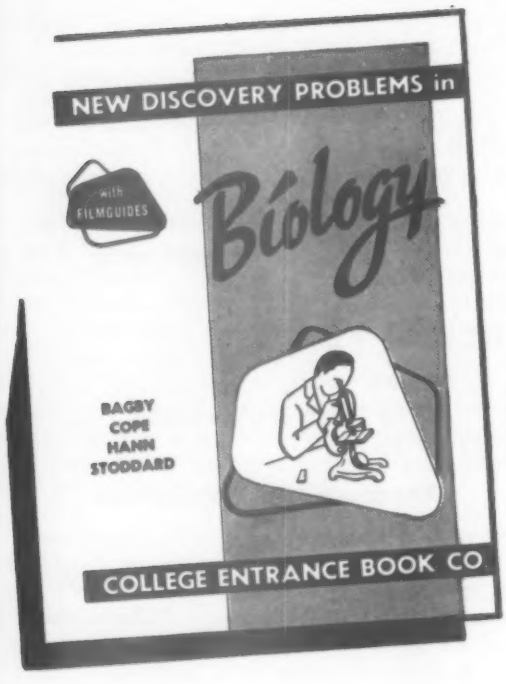
This republication of Prof. S. Morgulis' 1938 translation is important particularly because of his preface introduction, which significantly treats certain concepts of cell structure and functions as related to the outmoded cell theory and possible origins of life and living organisms today from unit particles, enzymes, and products within protoplasmic structure. This introduction alone is worth-while reading for all teachers of the life sciences and the main part of the book, perhaps, for background information.

B. BERNARR VANCE,
University of Dayton

HERSKOVITZ, MELVILLE J. *Franz Boas: The Science of Man in the Making.* Charles Scribner's Sons, New York. 131 pp. 1953. $2.50.

Luster is added to the Twentieth Century Library series on great men of recent times by the completion of this interpretation of the influence of a great anthropologist. Dr. Herskovitz analyzes the impact with skill and sympathy. "Man, the Biological Organism," "Man, the Culture-Building Animal" and "Man, the Creator" are three of the chapters particularly worth reading of the five in this slender volume.

CHARLES E. PACKARD,
Randolph-Macon College



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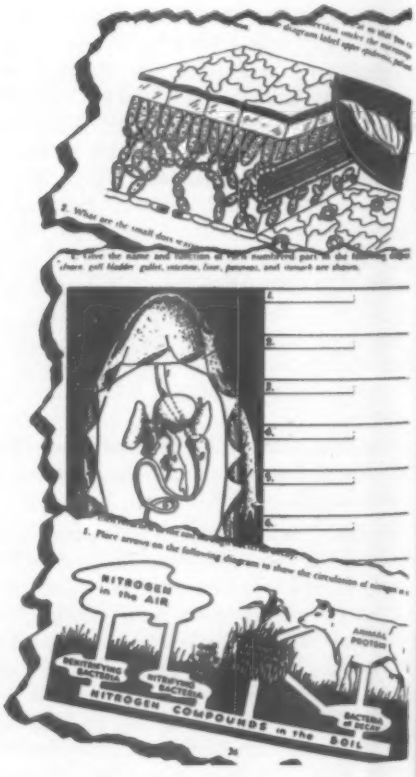

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AUDIO-VISUAL NEWS

HAVE YOU HEARD?

. . . Disney's second feature length True-Life Adventure is "The Vanishing Prairie." Of particular interest to midwesterners as far west as the Rockies, this promises to be a documentary which will command the attention of all of us. Featured stars will include the buffalo, antelope, coyote, sage grouse, and the inimitable prairie dog. Although the film could not be reviewed for this issue, it bears promise of presenting a significant ecological story of wildlife on the plains.

. . . Under a new arrangement, distribution of True-Life Adventures for classroom and other non-theatrical use is handled through some 77 licensed Disney agents. At present, "Seal Island" can be obtained in this way, either on a short-term or long-term basis. If you would like to know where you should apply for one of these films, or if you would like a copy of the new informative booklet, "New Explorations in True-Life Adventures and People and Places," write to Carl Nater, Director, Non-Theatrical Division, Walt Disney Productions, 2400 West Alameda Avenue, Burbank, California.

. . . "A Directory of 2002 16mm. Film Libraries" will give you film information and addresses for distributing libraries throughout the continental United States, Alaska, Hawaii, and Puerto Rico. For only 35¢, you can obtain this useful bulletin from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Ask for Bulletin 1951, No. 11, of the Office of Education.

. . . Filmstrips in color are being produced by Young America Films to accompany the Golden Nature Guide series of publications. A recent release is "American Trees," which is planned to accompany Zim and Martin's "Trees," published by Simon and Schuster.

. . . This column is one of the regular activities of the Audio-Visual Committee. If you have comments or contributions to make, or if you would like to participate in the activities of this group, please write to Emery L. Will, Science Department, State University Teachers College, Oneonta, N. Y.

"BIOLOGY IN THE NEWS"

Antivivisection: A Threat to You, Harriet Hester, *Coronet,* Jan. 1954, pp. 108–112.

Dogs are disposed of in gas chambers because they have no homes, and yet the medical schools are in need of dogs for carrying out life-sustaining experiments. And all of this because misguided people, who do not understand how animals are treated in experimental laboratories, prevent their use for proper ends.

Shock Troops of the Virus War, Tric Coffin, *Coronet,* Jan. 1954, pp. 57–61.

An account of the trials and setbacks of those scientists who would and did lick the typhus germ by producing the proper anti-serum.

The Latest on Flu—and It's Good News, Ruth and Edward Brecher, *Collier's,* Jan. 8, 1954, pp. 68–71.

Scientists are slowly winning the battle with influenza. More vaccines are producing gratifying results, and prevention may be nearer than we think.

Straight Teeth Cost So Much, Richard L. Frey, *Good Housekeeping,* Jan. 1954, pp. 49 & 157–161.

Teeth which are out of line may warp the personality or interfere with digestion. They can be straightened, but the cost is well beyond the ordinary family budget. This article discusses the reasons for present costs and suggests methods whereby malocclusion can be prevented.

My Battle Against Leprosy, Dr. Frederick A. Johansen with Wm. Peters, *Collier's,* Jan. 22, 1954, pp. 38–43.

Attitudes toward leprosy are changing even though no cure has been discovered. This article might be used effectively to stimulate discussion on the effects of attitudes and how scientific knowledge may change some of them for the better.

The Killer in Your Home, Dr. Benjamin F. Miller, *McCall's,* Jan. 1954, pp. 36–37 & 62.

The four cartoons in this article can do much for your home safety program. The danger spots pictured could initiate a survey by the students of the accident hazards in their own homes.

How You Can Double Your Chances Against Cancer, Albert Q. Maisel, *Woman's Home Companion,* Jan. 1954, pp. 40–41 & 80 & 89–91.

Well staffed cancer clinics, about 300 of them, are effecting a steady rise in the number of cures among cancer patients. Criteria for such adequate clinics and the work they do are discussed. Of interest to girls.

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